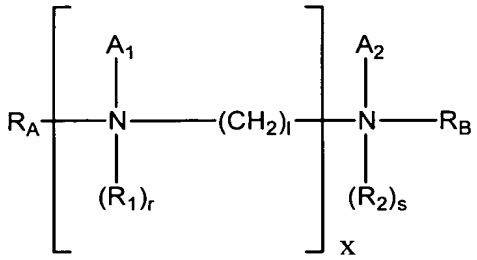
CLAIMS

We claim:

1. A compound or polycation having the formula:



or salt thereof where:

x is an integer ranging from 1 to about 20;

l is an integer ranging from 1 to about 6;

r and s, independently of one another, are 0 or 1, wherein when r is 1, the N bonded to R_1 and A_1 has a positive charge, and when s is 1, the N bonded to R_2 and A_2 has a positive charge;

R_A and R_B, independently of one another, are selected from the group consisting of H, or an alkyl, hydroalkyl or thiol-substituted alkyl group having from 1 to 6 carbon atoms;

R1 and R2, independently of one another, are selected from the group consisting of alkyl groups having 1 to about 6 carbon atoms; and

A1 and A2, independently of other A1 and A2 groups, are selected from the group consisting of a $–CH(D–L)_2$ and a $–C(D–L)_3$ group wherein D is selected from the group consisting of –CO–, $–CO_2–$, –O–C–O–, –CO–N–, –O–CO–N–, –O–, and –S–, and L is selected from the group consisting of:

(a) a straight chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring $–CH_2–$ groups can be replaced with an O or S atom;

(b) a substituted straight chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic

heterocyclic or polycyclic ring and wherein one or more of the non-neighboring neighboring $-CH_2-$ groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom; and

(c) an aromatic, alicyclic, heterocyclic and a polycyclic ring moiety.

2. The compound or polycation of claim 1 wherein L is selected from the group consisting of a straight chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring $-CH_2-$ groups can be replaced with an O or S atom.

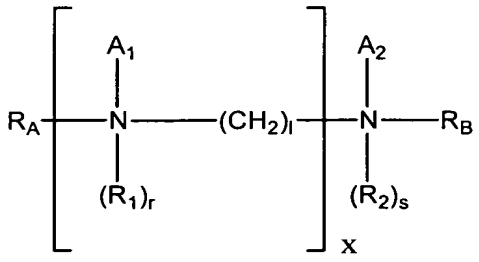
3. The compound or polycation of claim 1 wherein L is selected from the group consisting of a substituted straight chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic heterocyclic or polycyclic ring and wherein one or more of the non-neighboring neighboring $-CH_2-$ groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom.

4. The compound or polycation of claim 1 wherein L is selected from the group consisting of an aromatic, alicyclic, heterocyclic and a polycyclic ring moiety.

5. A lipid aggregate which comprises one or more compounds of claim 1.

6. A method for delivery of a macromolecule to a cell comprising the step of contacting said cell with a composition which comprises the compound of claim 1 and said macromolecule.

7. A compound or polycation having the formula:



or salt thereof where:

x is an integer ranging from 1 to about 20;

l is an integer ranging from 1 to about 6;

r and s, independently of one another, are 0 or 1, wherein when r is 1, the N bonded to R_1 and A_1 has a positive charge, and when s is 1, the N bonded to R_2 and A_2 has a positive charge;

R_A and R_B, independently of one another, are selected from the group consisting of H, or an alkyl, hydroalkyl or thiol-substituted alkyl group having from 1 to 6 carbon atoms;

R1 and R2, independently of one another, are selected from the group consisting of alkyl groups having 1 to about 6 carbon atoms; and

A1 and A2, independently of other A1 and A2 groups, are selected from the group consisting of a B-L group wherein B is selected from the group consisting of –CO–, $–CO_2–$, –O–C–O–, –CO–N–, –O–CO–N–, $–O–CH_2–$, $–S–CH_2–$, $–CH_2–S–$, and $–CH_2–$ and L is selected from the group consisting of:

(a) a straight chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring $–CH_2–$ groups can be replaced with an O or S atom;

(b) a substituted straight chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic heterocyclic or polycyclic ring and wherein one or more of the non-neighboring neighboring $–CH_2–$ groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom; and

(c) an aromatic, alicyclic, heterocyclic and a polycyclic ring moiety.

8. The compound or polycation of claim 7 wherein L is selected from the group consisting of a straight chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring $–CH_2–$ groups can be replaced with an O or S atom.

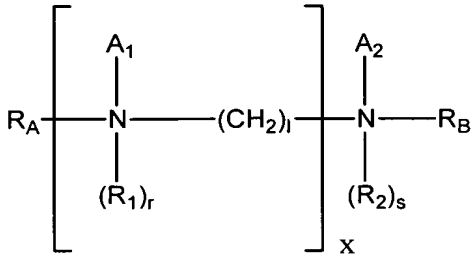
9. The compound or polycation of claim 7 wherein L is selected from the group consisting of a substituted straight chain or branched alkyl, alkenyl, or alkynyl group having

from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic heterocyclic or polycyclic ring and wherein one or more of the non-neighboring neighboring $-CH_2-$ groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom.

10. The compound or polycation of claim 7 wherein L is selected from the group consisting of an aromatic, alicyclic, heterocyclic and a polycyclic ring moiety.

11. A method for delivery of a macromolecule to a cell comprising the step of contacting said cell with a composition which comprises the compound of claim 7 and said macromolecule.

12. A compound or polycation having the formula:



or salt thereof where:

x is an integer ranging from 1 to about 20;

l is an integer ranging from 1 to about 6;

r and s, independently of one another, are 0 or 1, wherein when r is 1, the N bonded to R_1 and A_1 has a positive charge, and when s is 1, the N bonded to R_2 and A_2 has a positive charge;

R_A and R_B, independently of one another, are selected from the group consisting of H, or an alkyl, hydroalkyl or thiol-substituted alkyl group having from 1 to 6 carbon atoms;

R1 and R2, independently of one another, are selected from the group consisting of alkyl groups having 1 to about 6 carbon atoms; and

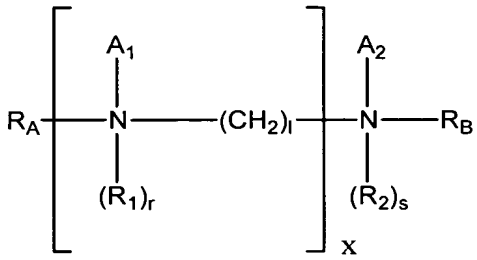
A1 and A2, independently of other A1 and A2 groups, are selected from the group consisting

of a substituted straight chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic heterocyclic or polycyclic ring and wherein one or more of the non-neighboring neighboring $-CH_2-$ groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom.

13. The compound or polycation of claim 12 wherein A1 and A2, independently of other A1 and A2 groups, are selected from the group consisting of a substituted straight chain or branched alkyl group having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic heterocyclic or polycyclic ring and wherein one or more of the non-neighboring neighboring $-CH_2-$ groups of said alkyl group can be substituted with an O or S atom.

14. A method for delivery of a macromolecule to a cell comprising the step of contacting said cell with a composition which comprises the compound of claim 12 and said macromolecule.

15. A compound or polycation having the formula:



or salt thereof where:

x is an integer ranging from 1 to about 20;

l is an integer ranging from 1 to about 6;

r and s, independently of one another, are 0 or 1, wherein when r is 1, the N bonded to R_1 and A_1 has a positive charge, and when s is 1, the N bonded to R_2 and A_2 has a positive charge;

R_A and R_B, independently of one another, are selected from the group consisting of H, or an alkyl, hydroalkyl or thiol-substituted alkyl group having from 1 to 6 carbon atoms;

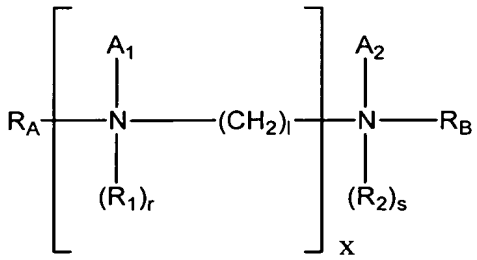
R1 and R2, independently of one another, are selected from the group consisting of alkyl groups having 1 to about 6 carbon atoms; and

A1 and A2, independently of other A1 and A2 groups, are selected from the group consisting of a straight chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more of the non-neighboring neighboring $-CH_2-$ groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom.

16. The compound or polycation of claim 15 wherein A1 and A2, independently of other A1 and A2 groups, are selected from the group consisting of a straight chain or branched alkyl group having from 2 to about 22 carbon atoms wherein one or more of the non-neighboring neighboring $-CH_2-$ groups of said alkyl group can be substituted with an O or S atom.

17. A method for delivery of a macromolecule to a cell comprising the step of contacting said cell with a composition which comprises the compound of claim 15 and said macromolecule.

18. A compound or polycation having the formula:



or salt thereof where:

x is an integer ranging from 1 to about 20;

l is an integer ranging from 1 to about 6;

r and s, independently of one another, are 0 or 1, wherein when r is 1, the N bonded to R_1 and A_1 has a positive charge, and when s is 1, the N bonded to R_2 and A_2 has a positive charge;

R_A and R_B, independently of one another, are selected from the group consisting of H, or an alkyl, hydroalkyl or thiol-substituted alkyl group having from 1 to 6 carbon atoms;

R1 and R2, independently of one another, are selected from the group consisting of alkyl groups having 1 to about 6 carbon atoms; and

A1 and A2, independently of other A1 and A2 groups, are selected from the group consisting of a straight chain or branched alkyl group substituted with one or two SH groups within about 3 carbon atoms of the bond between A1 or A2 and N.

19. The compound or polycation of claim 18 wherein the A1 and A2 groups have from 2 to about 22 carbon groups.

20. A method for delivery of a macromolecule to a cell comprising the step of contacting said cell with a composition which comprises the compound of claim 18 and said macromolecule.